

SPECIFICATION

TITLE OF INVENTION

Method and device for introducing state changes into athletic activities.

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

Not Applicable.

REFERENCE TO SEQUENCE LISTING , A TABLE, OR A COMPUTER PROGRAM LISTING COMPACT DISK APPENDIX

Not Applicable.

BACKGROUND OF THE INVENTION.

Most athletic activities require the participants to respond rapidly to changes in their environment. For instance, they must constantly reevaluate their course of action depending upon their own velocity and position and that of a ball, opposing players, and teammates. However in training, and especially in solo training, the environment tends to be largely static. In the game known as soccer in the U.S.A, and football elsewhere, a common training drill consists of a player dribbling a ball around a series of cones or other similar markers. Such variation as exists consists of predetermined decisions such as to alternate between passing on the left on one cone and on the right on the next. Effectively such training exists within an invariant environmental state.

The disadvantage of such a drill is that it does not train athletes to constantly observe, analyze, and react, as they must in a real game. The present invention allows the introduction of transitions between multiple environmental states, such transitions being either strictly periodic or randomly varying in frequency, enabling in training situations a better simulation of the timing and thought processes of the game in question. The invention also allows new types of games to be created and played which incorporate the varying states expressed by the device into the play of the game. The invention accomplishes these goals by maintaining a time varying internal state which is transmitted to athletes, typically via a visual method such as colored lights, so that the athletes may interpret these signals as a change in the training or game environment. In the soccer training drill the invention would replace the traditional practice cone and would indicate to the player the manner in which the ball should be passed around the obstacle.

The intentional introduction of transitions between multiple contest states is common in arcade and video games and other electronic entertainment but there is little precedent for this in athletics. The only common examples occur at or before the actual contest: the opening toss of a coin before a game or the drop of the flag in an automobile race. In music the periodic signal from a metronome is often used and there may be instances where the signal from such a metronome has been used to aid athletes synchronize their movements to music. That differs from the utility of the present invention, which is not synchronization, but the presentation of varying training or game states to the athlete.

The following U.S. patents disclose concepts that bear some relation to the present invention. However, none of the cited prior art discloses an invention having the versatility or utility of the present invention.

Goldfarb et al. U.S. Pat. No. 3,933,354 discloses a martial arts amusement device in which a light at one of ten positions on a picture of a combatant is lit. When a player strikes that position the light turns off, the player's score is incremented, and the game lights another region on the simulated combatant. The lights are selected from a pattern sufficiently complex to appear in random order to the player. This is a one or two player game. This invention is primarily a game rather than a serious athletic training device and it is described in very narrow terms without any general application to other types of athletic training or contests. This invention requires constant input from the player - the game will lock in any device state where a lamp is lit unless the player strikes the lit part of the display to allow it to transition to the next state. The designers recognized that a detector failure would render the game inoperable and provided a failsafe mechanism to transition should that occur - but such a transition is not a normal operating mode of the invention. In comparison, the invention of the present patent application, as it might be implemented for martial arts practice, would have lit one or more lamps for short periods of varying duration during which a lit lamp would have been a target for the athlete. The device would then have transitioned to another device state whether or not the athlete succeeded in striking the target.

Elstein et al. U.S. Pat. No. 4,702,475 disclose a sports technique and reaction training system in which a particular movement pattern is to be executed by the

participant in a given amount of time in response to a start signal that determines which of several such patterns is to be executed. This invention requires that the participant return to a base position to trigger another training cycle - so that the time required to complete the movement pattern may be measured. Moreover, the purpose of the invention is to train the participant to carry out a choreographed set of motions in minimal time. The present invention is very different. Some of the differences are: the position of the athlete with respect to the device is not fixed (there are no intrinsic start and stop positions); the device runs independently of the athlete's actions (other than setting it and turning it on, the athlete would not normally affect the state of the device); more than one device could be simultaneously employed in training or during a game by an athlete or athletes; and the utility of the invention is to provide state transitions in training to better simulate actual play, or in play, to provide more variety to the game, but not to improve the performance of a predetermined choreographed set of motions.

BRIEF SUMMARY OF THE INVENTION

This invention is to be employed in the training of athletes and the playing of athletic games. During these activities athletes observe and respond to signals that vary with time and are generated and displayed by the invention. In this manner the invention adds a new element to athletic training and enables new types of sports to be played.

SUMMARY OF THE INVENTION

The present invention provides for one or more logical states to be continuously varied, either periodically or randomly, and for this state information to be transmitted to one or more athletes for the purpose of varying the training or game environment. The athlete would perceive this information either visually or aurally as appropriate for each sport. For a specific example consider again the soccer drill described above. The device in this case would either adorn or replace the typical cone marker and would maintain via electronic, mechanical, optical, or other means two binary variables which would transition between their On and Off states in a periodic, random, or pseudorandom pattern. This information would be conveyed to the athlete visually - for instance, by providing two rings of light around the cone, one blue, one red, which are lit according to the value of the matching state variable. Together these two state variables would encode four device states with the local (to this cone) meanings "Pass on Left", "Pass on Right", "Pass on Left or Right", and "Do not Pass". The time fraction the device spends in each state would be adjustable, as would be the mean frequency of the transitions between these device states and the minimum hold time spent in each device state before a transition was permitted. An athlete approaching the cone would observe the state of the

device and respond as appropriate. Even this simple four state training device could easily be employed in numerous other drills in this and other sports. For instance, the same four state device placed at the top of the basketball key could indicate "left side layup", "right side layup", "shoot from the top of the key", or "shoot immediately." In baseball it might tell a pitcher to throw a curve, slider, fastball, or to throw out the runner at first base. The invention may also be used to globally alter the rules of the athletic contest or practice. Examples: "when the red light is lit players may not shoot on goal" or "player number 5 may shoot".

BRIEF DESCRIPTION OF THE DRAWINGS

The manifestation of the present invention will necessarily vary depending upon the particular sport it is applied to. This is particularly true when considering aquatic versus terrestrial playing environments. To illustrate this invention a preferred embodiment is presented for use in the context of a terrestrial game like soccer.

Figure 1 shows the exterior of the invention as viewed from the side.

Figure 2 shows a block diagram of the mechanism.

DETAILED DESCRIPTION OF THE DRAWINGS.

Figure 1 is a drawing of the exterior of the preferred embodiment of the invention. There are two rings of colored LEDs on the device, a red one located near the cone's tip **10** and a blue one located near the middle of the cone **20**. The remainder of the exterior of the device is composed of a strong and durable plastic in a contrasting color such as yellow or light orange **30**.

Figure 2 shows a block diagram of the mechanism. A removable battery provides power **40**. It is connected to a small electronic module **50**. This module is a typical embedded microprocessor based controller that reads its program from internal read only memory. When power is applied via an ON/OFF switch **80**, and at one second intervals thereafter, the controller reads the desired device settings from two dials **100, 110**, and from a pair of 8 position DIP switches DP1,DP2 **120,130**, and uses its internal program and this setting information to drive the blue **60** and red **70** sets of display LEDs (also Figure 1 **10,20**). Dial 1 **100** controls the mean frequency at which the device changes state, which can be varied between 600 transitions per minute and 0.1 transitions per minute. Dial 2 **110** sets the minimum hold time a device state must be maintained before a state transition is allowed and is variable between 200 milliseconds and 5 minutes.

The switches on DP1 and DP2 (**120** and **130**) control the device in the following manner: DP1,0 determines if the transitions are periodic (fixed rate) or randomly varying around a mean frequency.

DP1,1 determines the device state transition order as sequential {0,1,2,3,0...} or random.

DP1,2-4 determine the occupancy for device state 0

DP1,5-7 determine the occupancy for device state 1

DP2,0-1 unused

DP2,2-4 determine the occupancy for device state 2

DP2,5-7 determine the occupancy for device state 3

The occupancy values set on DP1 and DP2 are integers in the range 0 through 7.

The total occupancy for the system is the sum of the four device state occupancies. For instance, if these values were 0,5,3,2 (for states 0 through 3, respectively) the device would never enter state 0, would spend 50% of its time in state 1, 30% in state 2, and 20% in state 1. To vary only between states 1 and 2, and spend equal time (on average) in each the setting would be 0,N,N,0 where N is between 1 and 7. When used in the soccer dribbling drill application a typical setting might be: random transitions with a mean frequency of 15 transitions per minute, a minimum hold time of .5 seconds, random transition order, and occupancies set to 2,7,7,2. It is assumed that situations will arise where the invention will also be used as a static marker in fixed state. To lock the device into state 2 the occupancy values would be set at 0,0,7,0.

The table below shows the states of the signal lights and their interpretation by the athlete. The first column indicates the state of the red LEDs, the second column the state of the blue LEDs, the third column the device state, and fourth column indicates the interpretation of the device state to be made by the athlete within the context of a soccer dribbling drill.

Red Lights	Blue Lights	Device State	Meaning to player
off	off	0	Do not pass
on	off	1	Pass on right side
off	on	2	Pass on left side
on	on	3	Pass on either side

One example of the invention has been described here in detail to comply with the Patent Statutes and to prove that this device could be constructed by skilled in the arts. It

is emphasized that numerous other implementations of the invention are possible, none of which depart from the scope of the invention itself. These include, but are not limited to: utilizing similar or different implementation technologies; utilizing similar or different implementation details; customizing for one or more different sports; utilizing more or fewer device states; utilizing physically larger or smaller devices; utilizing multiple independent devices simultaneously on the athletic field; utilizing devices which are carried by the athletes or attached to athletic equipment; utilizing remote control of multiple devices which all display the same state; utilizing remote control of multiple devices which display different states; providing in addition to the display of device state information the relaying of communications from coaches, referees, and/or other players.